59

PROGRESS OF THEORETICAL PHYSICS

Founded by H. Yukawa in 1946

Advisory Council

K. HUSIMI, Nagoya M. KOBAYASI, Kyoto M. KOTANI, Osaka T. MUTO, Tokyo T. NAGAMIYA, Osaka S. SAKATA, Nagoya M. TAKETANI, Tokyo S. TOMONAGA, Tokyo

Editor

H. YUKAWA, Kyoto

Volume 41

JANUARY—JUNE

1969

Published for the

Research Institute for Fundamental Physics and

The Physical Society of Japan



CONTENTS

No. 1 January

Theory of Magnon Sidebands in MnF2 Takashi Tonegawa	1
Superconducting Tunneling through the Barrier with Paramagnetic	
Impurities Hiroyuki Shiba and Toshio Soda	25
Kondo Effect in Superconductor Fumihiko Takano and Seitaro Matayoshi	45
Long-Distance Behaviors of the Pair Distribution Function of De-	
generate and Non-Degenerate Bose Fluids	
	60
A Phenomenological Representation of High Energy Scattering of	
Hadrons Masao Shiohara	88
On the Repulsive Core and the Nonstatic Effects of Nuclear Forces	
in Momentum Space Masanobu Wada	105
One-Boson-Exchange Modes and Two- and Three-Pion Exchange	
in Nucleon-Nucleon Interaction. I	
Susumu Furuichi, Tamotsu Ueda, Wataro Watari and Minoru Yonezawa	131
Low Energy Limit of Photopion-Production Amplitudes in Chiral	
Dynamics Masataka Hosoda and Kazuhiko Ozaki	145
Dynamical Model for the Nonleptonic P-Wave Decay of Hyperons	
Naoki Tokuda	153
Barger and Cline's Rule and Bound States of Dirac Particle	
	161
Nonleptonic Hyperon Decays in the Covariant Chiral $U(6) \otimes U(6)$	
Scheme	166
A Phenomenological Angle for $SU(3)$ -Symmetry Breaking. II ——Non-	
Leptonic K-Meson Decays and $\Delta I = 1/2$ Rule— Kimiaki Konno	176
V-P-P Vertex in the Dynamical Composite Model	
	182
Remarks on the Convergence Problem of the Generalized Partial	100
Wave Expansion	191
Algebra of Field in the Stückelberg Formalism	222
Minoru Omote and Yoshimasa Takaya	202
High Spin Propagation of Massive and Massless Particles	24.1
	214
General Theory of Multiple Poles and Coinciding Simple Poles	200
	233
Connection between the Absorptive Part of the Scattering Ampli-	
tude and That of the Feynman Integral Associated with the	050
Tetrahedron Graph Masatsugu Minami and Hideo Miyata	252
Clifford Algebra and Massless Particles	0.0
T. S. Santhanam and P. S. Chandrasekaran	264

Letters to the Editor:		
Limit for Measurement of Length and Quantum Theory	269 271	
Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Sum Rules for Non-Conserved Currents and O(4) Symmetry Spectral Function Spectra Function Spectra Function Spect	273	
No. 2 February		
Second Sound in Superfluid Helium	275	
Kinetic Theory of Collective Modes in Classical Liquids Junzo Chihara	285	
Dynamic Critical Fluctuation of Superconductivity Order Parameter	200	
above the Transition Point	296	
A General SCF Formalism Sigeru Huzinaga	307	
Effects of Collisions on Temporal Plasma Wave Echoes	301	
· · · · · · · · · · · · · · · · · · ·	313	
Yoshi H. Ichikawa and Takehiko Suzuki	212	
A Self-Consistent Approach to Spin Systems ——Dynamical Critical	200	
Phenomena—	322	
An Interpolation of the HNC and PY Integral Equations for Classical	220	
Fluids	339	
Existence of Three Transition Temperatures in Partly-Decorated Honeycomb and Dice Lattices of Ising Spins		
	350	
The Wiener-Hermite Expansion with Time Dependent Ideal Random	550	
Function	358	
Propagation of Shock Waves in Inhomogeneous Gases. VI ——Oblique		
Hydromagnetic Shock Propagation—		
	207	
Zero-Point Energy and Continuous Creation of Matter in an Ex-	367	
	000	
panding Universe	382	
Study of Deuteron Stripping Reaction by Coupled Channel Theory. I		
—Variational Formulation and Discussion on Basic Equations—		
Takashi		
Ohmura, Bunryu Imanishi, Munetake Ichimura and Mitsuji Kawai	391	
Isobaric-Spin-3/2 States and Intermediate Symmetry States in Three-		
Body Nuclei	419	
Regge Pole Model of Strange Vector and Tensor Meson Exchange		
Processes Kazuo Koike	442	
Large Angle Scattering and Linear Regge Trajectory. Toshihiro Yoshida	453	
One-Boson-Exchange Modes and Two- and Three-Pion Exchange in		
Nucleon-Nucleon Scattering. II		
Susumu Furuichi, Hiroshi Suemitsu, Wataro Watari and Minoru Yonezawa	461	
A New Mass Formula of Elementary Particles Yasushi Muraki	473	

$K{ ightarrow}2\pi$ Decays and Dispersion Relations	
······Yoshio Matsuzaki and Okiyasu Shito	479
Symmetry Breaking Effects in Nonleptonic Decays of Hyperons	110
	491
Multiple Poles in the Off-Shell Scattering Amplitude Seichi Naito	500
Daughter Trajectories, the Freedman-Wang Cancellation and Multiple	500
Regge Poles	516
Representation of the Wightman Function in Terms of Two-Point	310
Singular Functions Masatsugu Minami	527
Vector Spaces with Indefinite Metric and Pole-Type Ghosts	021
Kan-ichi Yokoyama and Reijiro Kubo	542
Letters to the Editor:	012
Chew-Frautschi Plot for Nucleon-Nucleus ScatteringS. Iwao	ECO
A Test of Regge Pole Model	560 562
On the Commutator of Non-Conserved Stress Tensors Y. Ezawa and T. Kimura	563
A New Method for Many-Body Systems in Impure Crystals H. Ueyama	565
Antiferromagnetism of the Electron Solid	566
P-Wave Decays of Hyperons. II	567
	568
A Possible Mechanism of Direct Production of Muon Pairs at High Energies	
S. Hayakawa and K. Kikuchi	570
A Note on Sum Rules of $d\sigma/d t-t_{\min} $ T. Matsuoka, K. Ninomiya and S. Sawada Identification of β -Vibrational States in Deformed NucleiP. C. Sood	572 574
Identification of p-vibrational states in Deformed Naciety	914
No. 3 March	
No. 5 March	
Contribution to the Theory of Dielectrics — Nonpolar Molecules—	
Takahito Kaneyoshi	577
Thermoelectric Power in Dilute Magnetic Alloys Kazumi Maki	586
Longitudinal Spin Pair Correlation in Ferro- and Antiferromagnets	
with Uniaxial Anisotropy Hideho Tanaka and Kensuke Tani	590
Modified Landau Theory of the Second Order Phase Transition	
Yoshiki Kuramoto	604
Quasi-Classical Theory of Slow Neutron Scattering	
	619
Superconductivity in a Molecular Field	010
Satoshi Takada and Takeo Izuyama	635
Many-Body Variation Theory. I — Pair Correlation— Katuro Sawada	664
Many-Body Variation Theory. 1—— Tall Collection— Raturo Sawada	004
Multiple Particle Production in Proton-Nucleon Interactions at 22.6	
and 24 GeV/c Shun-ichi Hasegawa, Hirotada Nanjo,	675
Takeshi Ogata, Michinori Sakata, Kojiro Tanaka and Nobuo Yajima	675
The Lagrangian Approach to the Gravitational Instability in an Ex-	COC
panding Universe	686

Transfer Reaction of Heavy Ion in the Diffraction Model	
Takehiko Suzuki	695
Interaction between Clusters and Pauli Principle Sakae Saito	705
Pion-Nucleon Low Energy Parameters from Dispersion Relations for	
Inverse Forward Amplitude Osamu Miyamura and Fujio Takagi	723
Regge Pole Model of the Reaction $\pi N \rightarrow \omega N \dots$ Masayuki Nobuyama	730
A Model of CP Violation Kazuhiko Nishijima	739
Magnetic Moments of Nucleons in Strong Coupling Meson Theory	
	762
Coinciding Simple Poles in the Scattering Green's Function	
	780
Quantization of the Generalized Rarita-Schwinger Equation	
Toshiei Kimura and Kei Senba	788
Non-Leptonic Weak Interaction in Heisenberg's Non-Linear Field	
Theory Hiroshi Segawa and Hiroshi Yamamoto	801
Five Classes of Transformations of Dirac Spinors — The Free-	
Particle Dirac Equation is Brought to "po-, "p1-, "p2-, "p3- and	
"m-Linear" Forms— A. J. Bracken and H. A. Cohen	816
Letters to the Editor:	
Atmospheric Muons and Neutrinos	832
Formation of Galaxies from Hydrogen Gas T. Hirasawa, K. Aizu and M. Taketani Composite Model and High Energy Quasi Elastic Scattering	835
K. Hasebe, H. Kanada, K. Sakai and M. Yasuno	838
Formation of H ₂ and Galaxies in the Hot Universe. H. Takeda, H. Satō and T. Matsuda	840
Analysis of Proton-Nucleus Forward Scattering	841
Possible Existence of an Acausal Distance in High Energy Physics	843
Scaling—	845
Superconvergence Sumrules for $\rho\Sigma$ and $\rho\Xi$ Elastic Scattering	
V. P. Seth and B. K. Agarwal, K_{l3} -Decay Form Factors and Dynamical Group $O(4, 2)$ N. Arisaka and A. Toda	847
On the Contributions from Heavy Pseudoscalar Mesons to the Nucleon-Nucleon	848
InteractionS. Furuichi, W. Watari and M. Yonezawa	850
Construction and Testing of Superconvergent Sum Rules for a Linear Combination	
of Products of Amplitudes M. C. Sharma, V. P. Seth and B. K. Agarwal πK Scattering Amplitude of the Veneziano Type N. Tokuda	852 853
Collapse and Flare-up of Protostars S. Narita, T. Nakano and C. Hayashi	856
Erratum	
Analysis of $\pi^+ p \rightarrow \pi^0 N^{*++}$ Reaction by Regge Pole Model (Vol. 39, p. 394) A. Iwaki	858
No. 4 April	
Theory of Phase Transitions in Solid Methanes. IV — Upper Tran-	
sition Temperatures in Solid CH ₃ D and CHD ₃ and Solid Solution	
of CH ₄ and CD ₄ ——	
Hideo Yasuda, Tsunenobu Yamamoto and Yosuke Kataoka	950

Fermi-Liquid Theory of Linear Antiferromagnetic Chains	
····· Tomoji Yamada	880
Ultrasonic Attenuation in Magnetics at Low Temperatures	
Kensuke Tani	891
Motion of the Vortex Lattice in a Pure Type II Superconductor	
Kazumi Maki	902
Energy Spectrum of the Excitations in Liquid Helium II	
Sigenobu Sunakawa, Shuichiro Yamasaki and Takeji Kebukawa	919
Dynamics of the Ising Model near the Transition Point. II	
Ryuzo Abe and Akira Hatano	941
Thermodynamical Functions of a Dilute Hard-Sphere Bose Gas	(
Shokichi Kanno	949
A Method of a Quasi-Linear Canonical Transformation for the Many-	010
Body Problem. I	966
Electron Spin Density and Internal Conversion Process Masato	200
Morita, Kenzo Sugimoto, Masami Yamada and Yoshimatsu Yokoo	996
Propagation of Shock Waves in Inhomogeneous Gases. VII—Time	330
Development of Gas Shock—	
Yôrô Ôno, Toshihisa Ishizuka and Tadashi Taira	1004
Hydrodynamical Behaviour of Gas Spheres with Masses of $10^4 M_{\odot}$ to	1004
10 ²⁰ M _☉	1021
Branch Cut Contributions to Backward Unequal-Mass Scattering	1021
	1041
Processes Takashi Obara	
Dynamical Implication of the $\pi N P_{11}$ Data Kisei Kinoshita	1040
Sum Rules Based on Khuri Amplitudes and Degeneracy of Regge	1057
Trajectories	1057
A Diagonalization Method of a Hamiltonian in Second-Quantization. I	1004
	1064
Derivatives of Baryon Trajectories at $W=0$	
Gaku Konisi and Takesi Saito	1081
Unequal-Mass Conspiracy for Arbitrary Spins	4001
Noboru Nakanishi and Noriaki Seto	1094
0(4) Symmetry and Relativistic Composite Model Hitoshi Ito	1109
Letters to the Editor:	
A Variational Consideration in Analogue Resonances	1118 1119
A Spin-Wave Theory of a Dilute Heisenberg Ferromagnet	1113
Proton Dynamics and Uniasome Attenuation of 1151 Type Tenesteen S. Isa and K. Kawasaki	1121
Erratum	
Magnetic Moments of Nucleons in Strong Coupling Meson Theory (Vol. 41, p. 762)	
Wagnetic Woments of Tractions in Strang Strang Company	1122

No. 5 May

Theory of Electron-Phonon Interaction Responsible for Current	
Saturation Phenomena in Semiconductors	
Jiro Yamashita and Ki-ichi Nakamura	1123
A Method of a Quasi-Linear Canonical Transformation for the Many-	
Body Problem. II — The Many-Boson Problem—	
Shokichi Kanno	1145
Dynamic Critical Phenomena in Magnetic Systems. II ——Electrical	
Resistivity near the Néel Point—Yukio Suezaki and Hazime Mori	1177
Transport Coefficients of van der Waals Fluids and Fluid Mixtures	
Kyozi Kawasaki	1190
Hydrostatic Instability in Very High Temperature Stars Naoki Itoh	1211
An Extension of Jastrow's Method for the Quantum Mechanical	
Many-Body Problem with Strong Forces. I	
S. Ali, M. E. Grypeos and L. P. Kok	1217
Effect of Pion-Nucleon Final State Interaction in Backward Pion	
Photoproduction from Deuterium in 1 GeV RegionYoshio Sumi	1227
Correction to One-Particle-Exchange Contribution and Two-Body	
Reaction at High Energy	
Mitsuru Hama, Atsuko Iwaki, Tohru Sokawa and Haruo Suzuki	1238
Large Angle Diffraction Scattering	
Reijiro Fukuda and Hironari Miyazawa	1247
The ¹ S ₀ Phase Shift of the Nucleon-Nucleon Scattering by the Nambu-	
Salpeter-Bethe Equation	
	1251
On the Breaking of Effective Chiral $U(3) \otimes U(3)$ Lagrangian	
	1260
Proposals for Measurement of CP Violating Parameters in K ⁰ Decays	
Using e ⁺ e ⁻ Colliding Beam	
Tsuneyoshi Kamae, Tadashi Kifune and Kenji Tsunemoto	1267
Theory of Nonleptonic Decays — Critique and Reformulation of the	
Nishijima-Swank Model	1273
A Diagonalization Method of a Hamiltonian in Second-Quantization. II	
——Application: Examples of Compatible Second-Degree Programs.	
Equivalence of Fermi and Yukawa Theories—	
	1289
A Canonical Field Theory of Chiral SymmetryShoji Ozaki	1309
Cancellation of the Singularities of the Backward Unequal-Mass	_000
Regge-Pole Terms Masatsugu Minami	1328
On the Solutions of the Bethe-Salpeter Equation in the Unequal-	2020
Mass Wick-Cutkosky Model in the Moving SystemKenji Seto	1340

The Non-Local Field Theory of the Quark Model Ikuo Sogami	1352
An Extended Formulation of Quantum Electrodynamics	
Tetsuro Kitazoe, Nobumichi Mugibayashi and Yuji Nakawaki	1366
Letters to the Editor:	
Cluster Expansion for Random Systems	1375 1376 1378 1379 1381 1382 1384
Erratum	
A Molecule-like Structure in Atomic Nuclei of ¹⁶ O* and ²⁰ Ne (Vol. 40, p. 277) H. Horiuchi and K. Ikeda	1386
No. 6 June	
Critical Anomaly of the First Sound in a Bose Liquid above the	
Phase Transition Point	1387
Phase Separation in Rotating Helium	
	1395
Superfluid Vortex, Trapping Neutral Impurities	1401
Free Energy Shift of Conduction Electrons Due to the s-d Exchange	1401
Interaction Kei Yosida and Hirosi Miwa	1416
The Approximate Expression of Green's Function for the Calculation	
of Electronic Structure in Metals and Alloys	* 100
Junjiro Kanamori, Kiyoyuki Terakura and Kosaku Yamada	
On the Distribution of Zeros for the Heisenberg Model. Masuo Suzuki	
On Relativistic Statistical Thermodynamics Sadao Nakajima	1450
Density Perturbation and Preferential Coordinate Systems in an Expanding Universe	1461
Gross Theory of Nuclear β-Decay. Kohji Takahashi and Masami Yamada	
On the Effect of Higher π -N Resonances on the N-N Scattering	
Susumu Furuichi and Tohru Sokawa	1504
Single Pion Production in Low Energy Pion-Nucleon Scattering and	
Chiral Dynamics	1515
Hattori, Makoto Kobayashi, Hiroki Kondo and Toshihide Maskawa	1919
The Rearrangement of Sakatons and High Energy Two-Body Scattering. II Takeo Matsuoka, Kansuke Ninomiya and Shoji Sawada	1533
Veneziano's Model for Pseudoscalar-Pseudoscalar Scattering, Factoriza-	
tion and the Nonet Ansatz Fujio Takagi	1555
The Goldberger-Treiman Relation and Its Kaon Analogue as a Non-	
Group-Theoretical Kinematics Generating an $SU(3)$ Symmetry Takao Okabayashi	1566
The Physical Basis of Combined Symmetry TheoriesR. Mirman	1578
THE THE DESIGNATION OF THE PARTY OF THE PART	

Letters	to	the	Editor.
Leners	LO	ше	Editor:

	Difference between the Neutron and Proton Distributions in Nuclei	1585
	A Proposal of the Method for Energy Measurements of Muons over 10 TeV T. Wada and T. Kitamura	1587
	Anomalous Magnetic Moment of the Nucleon and the Mass Difference of Mirror Nuclei K. Okamoto	1589
	On the Hyperon Decays in Heisenberg's Theory	1591
	Cosmic Background X-Rays Produced by Intergalactic Innerbremsstrahlung. S. Hayakawa	1592
	On Alpha-Clustering in Nuclear Matter Y. Akaishi and H. Bandō	1594
	Time Variation of the Fundamental Constants of Physics. J. O'Hanlon and KK. Tam	1596
	The Ground State Energy of an Electron-Spin System Coupled by Ferromagnetic Interaction	1598
	Effect of Thermodynamic Fluctuation of the Superconductivity Order Parameter on the Tunneling Current	1600
	A Graphical Method for Constructing N-Particle Veneziano AmplitudesS. Hori	1601
	Phenomenological Theory of Superfluidity near the λ-Point	1603
	Backward Peak in Proton-Deuteron Elastic Scattering at High Energy	1605
Aut	thor Index to Volume 41	1607
Subject Index to Volume 41		
Contents to Volume 41		
01	to totalic H	1